Users Manual for

PC CAN Adapter

CANKey

Installation and Setup

CE

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Note

This manual as well as the hardware module CANKey (also called "adapter") was produced with great care. Should you have any comments, corrections or suggestions to the manual or the adapter, please forward them to the address given below.

When operating this unit, please follow the relevant safety rules. No guarrantee or restitution for damage or subsequent damage caused by this product will be made. The use of this product is done at one's own risk. Any warranty will be void if this manual isn't strictly followed.

We cannot guarrantee that this module works with every hardware and software combination due to the large number of possibilities. After inspecting this product, you as end user or licensee respectivly, will accept it „as is". Nevertheless the manufacturer grants a two years limited warranty for the adapter and the data media for parts and labour starting with the purchase date. Any deficiencies that do not reduce the suitability or usability of this product remain out of scope of this warranty. The manufacturer is liable only for errors due to gross negligence or intent. In any case the liability is limited to the value of the product itself.

The manufacturer reserves the right to change the product as well as the accompanying software and documentation at any time and to deliver modified products.

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1. General Notes

1.1. Safety instructions

For other countries their respective regulations and safety guidelines apply.

When working with products that can come in contact with electric voltage, the applicable safety regulations have to be obeyed. For Austria these are in particular VDE 0100, VDE 0550/0551, VDE 0700, VDE 0711 and VDE 0860 resp.. ÖVE EN-1, ÖVE E 8001, ÖVE EN 60 742. Please keep this instruction manual in a safe place for future reference. If you hand over this CANKey (also called "adapter" in the following context) to other persons, make sure to include this manual.

Additionally please note the following safety guidelines:

- Only use the module for the purpose for which it is intended and check that it has been installed correctly. If in doubt, consult a professional, expert or ask the manufacturer of the adapter.
- Operation of the adapter is only admissable in the supplied case. The adapter is not suitable for open-air operation.
- Examine all external wiring before attaching for breaks or insulation failure. Repair all defects immediately before connecting to the adaptor.
- Opening of the adapter is only admissable for trained experts with appropriate specialized knowledge. Opening the adaptor by the use will void the waranty.
- When setting up electronic components, install them according to the specifications given in the manual supplied with the equipment.
- Please note that operation or connection errors are out of our scope of influence and we cannot take over any liability for resulting damages.
- All semiconductors, especially ICs, are susceptible to static discharge. Make sure your body is not electrically charged by touching a metal body first (e.g. a copper water pipe). Wearing a ground strap or working on a ground mat is highly recommended.

1.2. Functionality of the adapter

The Zimo digital command control system is equipment for operating a model railroad. It uses the CAN bus for communication with throttles, accessory and track section modules etc.

The CANKey adapter serves as connection between a PC and the components of the Zimo digital command control system using Zimo's CAN bus. It can be attached to any usual PC using the serial or the USB port (USB V1.1, V2.0 or V3.0). In the first case the power supply of the adapter is done via the PC's keyboard connector using the supplied splitter cable, in the second case power is obtained directly from USB. The adapter is the same for both options, only the connecting cables differ.

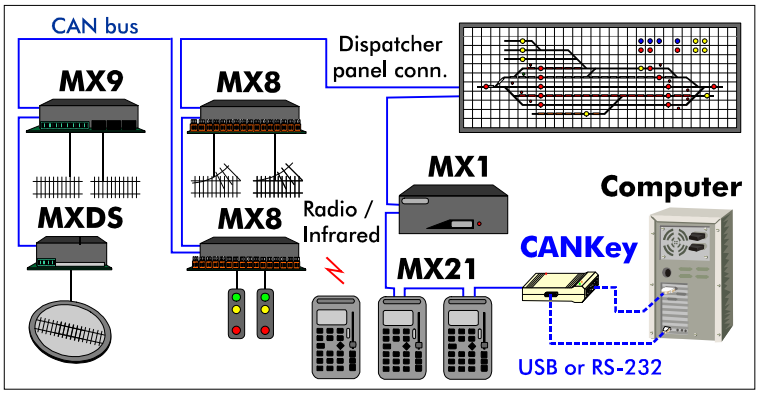


Fig. 1: Context of the CANKey adapter in the Zimo DCC system

The adapter transfers all commands sent over the CAN bus ("telegrams") to the PC and can also transmit commands coming from the PC to the CAN bus. The proper operation of the device as well as the reception of data from the CAN bus and the transmission of commands from the PC are indicated by differently colored light emmiting diodes (LEDs) on the case of the adapter.

1.3. Areas of usage

The main usage of the CANKey is the connection of the Zimo Digital Command Control system to railroad dispatching software on a PC, such as STP. Although the base unit of the Zimo system is equipped with a serial interface for the connection to a PC, specific command types and messages are only available via CAN bus. Additionally the CAN bus data transfer speed of 125 kBit / sec is faster than the serial interface and data transmission over the CAN bus is handled in a more secure way.

Additional information for the CSA-32 modules can be found in the STP manual and the CSA-32 instructions.

Also the connection of CSA-32 modules, which allow (in conjunction with the lamp driver module PLV-32 and the pushbutton module PTP-64) the connection of an external dispatcher table, is handled over the CAN bus.

Before the CANKey was avaialble STP was delivered with a program protection device ("Program Key"), to be attached to the PCs parallel printer port. This functionality is now also covered by the CANKey, which implies that the CANKey has to be attached properly to the PC before STP can be activated (for details see "Setup for Operation" on page 7).

Ther serial number of the CANKey is printed on the enclosure.

For the usage with STP the CANKey is required to have a serial number lower than **9500**, higher serial numbers are intented for usage with software products of other manufacturers.

Generally the CANKey is suitable to all types of CAN bus connectivity (also outside of model railroading). A brief documentation of the software interface can be found in the addendum (see under "Data transmission protocol" on page 20).

1.4. Prerequisites

To be able to use the CANKey, the following prerequisites are necessary:

- A PC with an available serial port (COM1: - COM4:) or available USB port (USB V1.1 / 2.0 / 3.0, a low-power port is sufficient, i.e. max. 100mA of power drain)

- PS/2 keyboard connector (when attaching the CANKey via serial port)
- Windows ME, NT[1)], 2000, XP[2)], Vista[2)] or Windows 7[2)]
- CD-ROM or DVD drive
- STP release 5.06 or higher or another software product with CANKey support (for Windows Vista STP V5.11 or higher, for Windows 7 or any 64 bit operating system STP 5.19 or higher)
- 6-pole Zimo CAN bus interface cable (with Western plugs)

[1)] This operating systems need special drivers to be able to connect USB equipment to the PC which are not part of this delivery. An operation of the CANKey under Windows 95 and Windows 98 is not intended.

[2)] These operating systems are supported in their 32- and 64-bit editions. Note that 64-bit support is a new feature and has not yet been tested under all circumstances.

1.5. Package contents

The CANKey adapter is delivered as fully assembled module with the following accessories (depending on the module type):

Count	Description	Remark
1	CANKey adapter	
1	Power supply cable	only for serial version
1	USB connection cable (2 x plug type "A")	only for USB version
1	STP update CD or driver CD (depending on the order)	contains the driver software and a test program

For easier identification of the items here an image of the supplied connection cables:

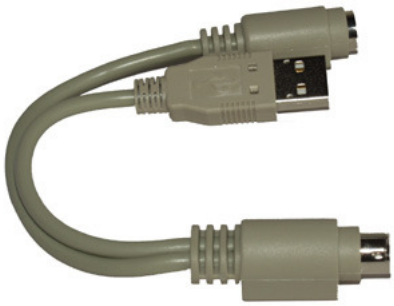


Fig. 2: Power supply connector for operation via serial PC port (RS-232)

The power supply cable is only necessary if the CANKey is attached to the serial interface (COM*x*:) of the PC. It will be inserted between the keyboard plug and the PS/2 keyboard connector of the PC. If the PC employs a DIN socket for the keyboard connection, an adapter has to used (not included).

Note: The USB plug of the power supply cable only serves to provide electrical power to the module, it furnishes no USB data connection!

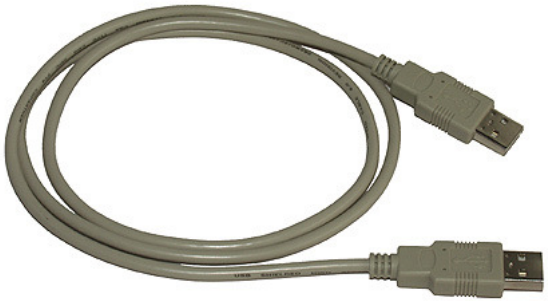


Fig. 3: USB connection cable

Please note also that no specific connection cable to the Zimo CAN bus is delivered with the adapter. The standard Zimo CAN bus cables as used to connect the Zimo components among each other (featuring the 6-pole Western plug) can be used.

Note: The connection cable for the attachment of the Zimo system to CAN adapters produced by Peak System (as featured in the Zimo price list) is not necessary nor suitable for the CANKey adapter.

2. Setup for Operation

2.1. Connectors and indicators

The CANKey adapter features three connectors and three visual indicators (LEDs). On the front side there is the connector for the serial interface (RS-232, 9-pole SUB-D socket), on the sidepiece there is the USB connector (type A) and on the back side the connector for the Zimo CAN bus (6-pole Western socket) is located.

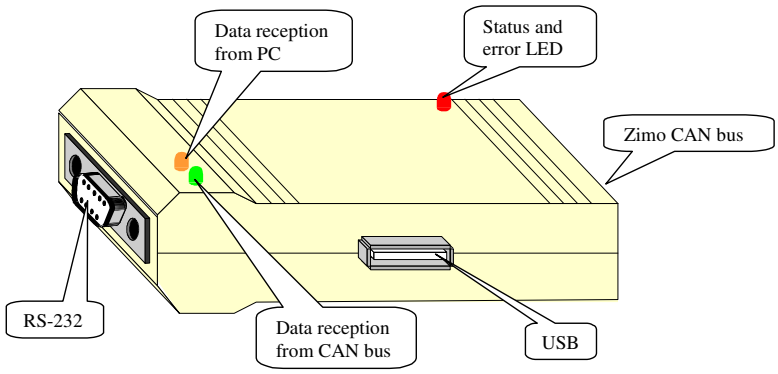


Fig. 4: Connectors and indicators of the CANKey adapter

Note: The adapter can only by attached to *either* a serial *or* an USB port of a PC. If both connections are available on the computer, the USB interface should be preferred.

On the top side of the adapter, three light emitting diodes (LEDs) are present to indicate its state. They have the following meaning:

Color	Type	Meaning
red	blinking (>10 / sec)	Adapter is waiting for interface selection (USB or serial)
	blinking (1 / sec)	Adapter ready, CAN bus comm. deactivated
	blinking (3-4 / sec)	Adapter ready, CAN bus comm. activated
	steady	Error state
	off	Error state
yellow	blinking	Data received from PC
yellow	steady	Error state
green	blinking	Data received via CAN bus

The following chapter will explain the connection options using serial and USB port in more detail.

2.2. PC connection via USB

This is the preferred method of attaching the adapter to the PC. Only if your PC has no (available) USB port, the serial interface option should be chosen (see "PC connection via RS-232" on page 12).

If the so-called "Sleep mode" is activated on the PC, problems may arise when attaching or detatching the adapter (see "Problem survival guide" on page 16).

The USB interface provides a feature called "Plug & Play", i.e. the adapter can be attached without shutting down the PC (for first time installation we recommend to shut down the PC anyway, see below). If the adapter has been attached successfully, it should remain connected to the PC permanently.

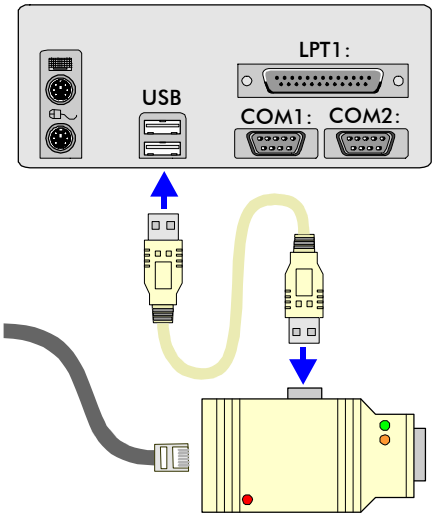


Fig. 5: CANKey connection via USB

It does not matter if STP is installed before or after the initial connection of the CANKey to the PC. Nevertheless the CANKey must be installed before the first activation of STP.

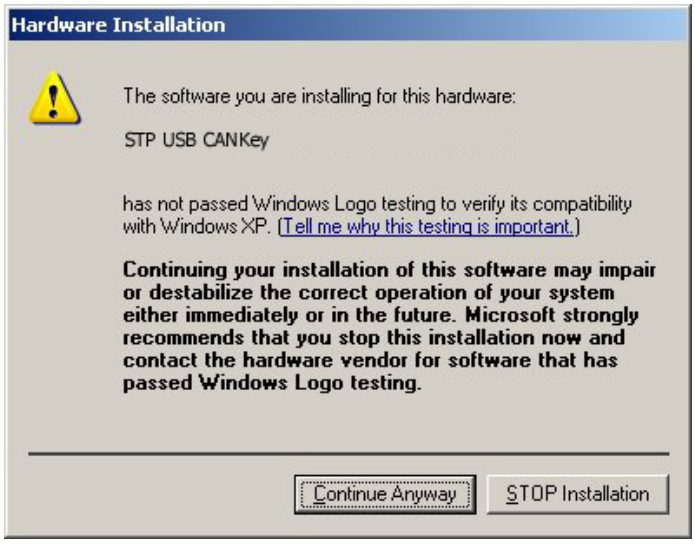
For the first time connection of the CANKey adapter to the USB port, a driver software has to be installed. This happens right after the attachment of the adapter to the PC, i.e. no software has to be installed before this action. To do this, simply follow the steps given below (the setup dialogues differ depending on the Windows version you are using, the general sequence is the same, though). The installation for Windows 7 (64 bit) is different, it is described in the chapter afterwards.

Setup for Windows ME, NT, 2000, XP, Vista and Windows 7 (32 bit)

1. Shut down your computer and turn it off (mains switch)
2. Connect the CANKey to a free USB port of the PC or an USB switch ("hub") using the supplied USB interface cable; the Zimo CAN bus should not yet be connected
3. Start the computer and activate the Windows operating system
4. The red LED of the CANKey should start flickering right after the startup of the PC; if this is not the case, shut down the computer and repeat the last two steps
5. During the startup of Windows a window will appear and notify you that a new hardware device was detected ("STP USB CANKey")
6. With some operatings systems (Windows XP, Vista, Windows 7) if an internet connection is established, a dialog will appear, asking if a new driver should be loaded via internet. In this case select the option **No, not this time** and click at **Next >**.

Found New Hardware Wizard
Welcome to the Found New Hardware Wizard
This wizard helps you install software for:
STP USB CANKey
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
Install the software automatically (Recommended)
Install from a list or specific location (Advanced)
Click Next to continue.
< Back
Next >
Cancel

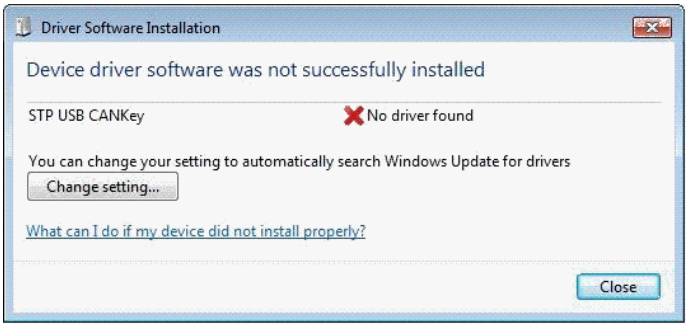
7. Now insert the setup-CD of your software product (i.e. the STP installation or update CD) into your CD / DVD drive and click at **Next** (possibly the installation process will continue automatically after the CD has been inserted); in case no proper driver has been detected, enter **X:**\ as installation path (X: should reflect the drive letter of your CD-ROM / DVD drive)
8. If Windows XP, Vista or Windows 7 is used, a note about an unverified driver will be shown; this is OK, so click at **Continue Anyway**.


Hardware Installation
The software you are installing for this hardware:
STP USB CANKey
has not passed Windows Logo testing to verify its compatibility with Windows XP. (Tell me why this testing is important.)
Continuing your installation of this software may impair or destabilize the correct operation of your system either immediately or in the future. Microsoft strongly recommends that you stop this installation now and contact the hardware vendor for software that has passed Windows Logo testing.
Continue Anyway
STOP Installation

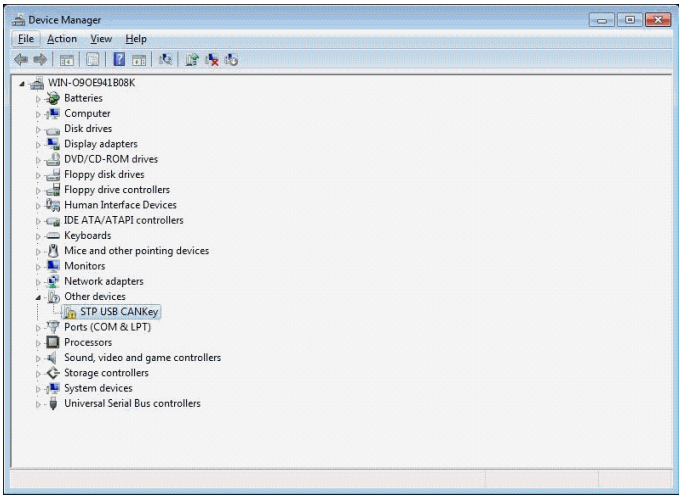
9. After some time a message about the end of the installation process will be shown; click at **Finish**
10. On some Windows versions a message will be displayed that the new device can be used now
11. When newer Windows versions are used (XP, Vista, 7) now a second new device will have to be installed ("Serial USB driver"), so the steps 6 – 10 have to be repeated (step 7 is skipped as the CD has laready been inserted)
12. Now the Zimo CAN bus can be attached by inserting the Western plug of the CAN bus cable into the proper socket of the adapter.

Setup for Windows 7 (64 bit)

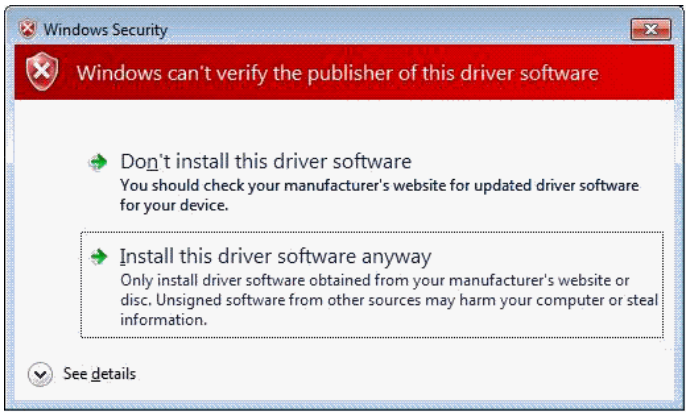
1. Shut down your computer and turn it off (mains switch)
2. Switch on the computer and start the Windows operating system
3. Connect the CANKey to a free USB port of the PC or an USB switch ("hub") using the supplied USB interface cable; the Zimo CAN bus should not yet be connected
4. The red LED of the CANKey should start flickering right after the startup of the PC; if this is not the case, shut down the computer and repeat the last three steps
5. A window appears notifying of a newly detected device ("STP USB CANKey") for which no driver software has been installed – click on **Close**


Driver Software Installation
Device driver software was not successfully installed
STP USB CANKey
No driver found
You can change your setting to automatically search Windows Update for drivers
Change setting...
What can I do if my device did not install properly?
Close

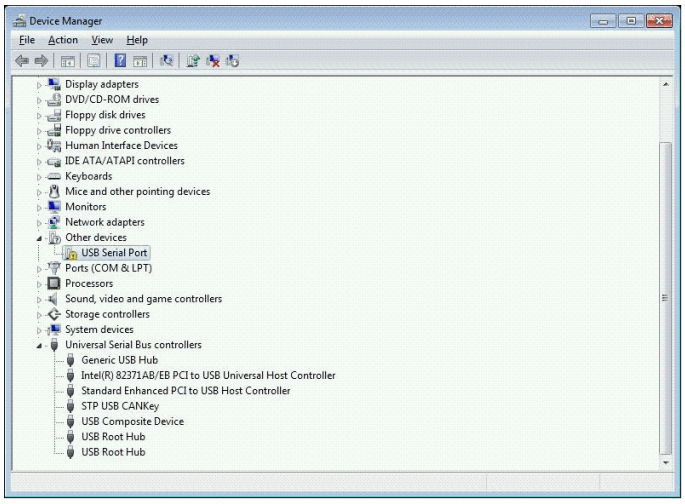
6. Open the Windows Device Manager (Start / Control Panel / Hardware and Sound / Device Manager)



7. Click on the **STP USB CANKey** entry using the *right* mouse button and select **Update Driver Software…** from the menu which will appear
8. Select **Browse my computer for driver software** in the next window, select your CD / DVD drive letter in the following window, insert the setup CD of your software product (i.e. the STP installation or update CD) into your CD / DVD drive and click at **Next** (if the STP installation procedure should be starting in the background you can simply close it)
9. A note will appear that the driver to be installed is not signed. Click at **Install this driver software anyway**


Windows Security
Windows can't verify the publisher of this driver software
Don't install this driver software
You should check your manufacturer's website for updated driver software for your device.
Install this driver software anyway
Only install driver software obtained from your manufacturer's website or disc. Unsigned software from other sources may harm your computer or steal information.
See details

10. After some time a message about the end of the installation process will be shown; click at **Close**
11. The Windows Device Manager will now show a second new device ("USB Serial Port") which has to be installed in the same way (repeat steps 7 – 10, for step 8 the CD is already inserted)



12. Now the Zimo CAN bus can be attached by inserting the Western plug of the CAN bus cable into the proper socket of the adapter.

Unistallation of the STP CANKey driver

To uninstall the driver (which normally should not be necessary), open the software inventory of the PC (**Start / Settings / Control panel** and then click at the **Software** icon) and look for the entry **FTDI FTD2XX *xxx* Drivers** (***xxx*** is a different text depending on the current driver version).

Click at **Change / Remove** and in the window that will appear, at **Continue** and then **Finish**. Note that the CANKey has to be detached from the PC before performing this operation.

Alternatively the driver can be removed by uninstalling the "STP CANKey" device from the Windows Device Manager (under "Ports" and under "USB devices").

When attaching the CANKey the next time, a new driver setup according to the procedure given above has to be done.

The verify the functionality of the CANKey, please follow the steps given under "First-time operation, test using CANfigurator" on page 13.

2.3. PC connection via RS-232

When using this connection type, no sleep mode should be activated on the PC.

For the installation of the CANKey adapter to a serial interface no driver setup has to be done. However, the adapter should only by attached and detached when the PC is shut off completely.

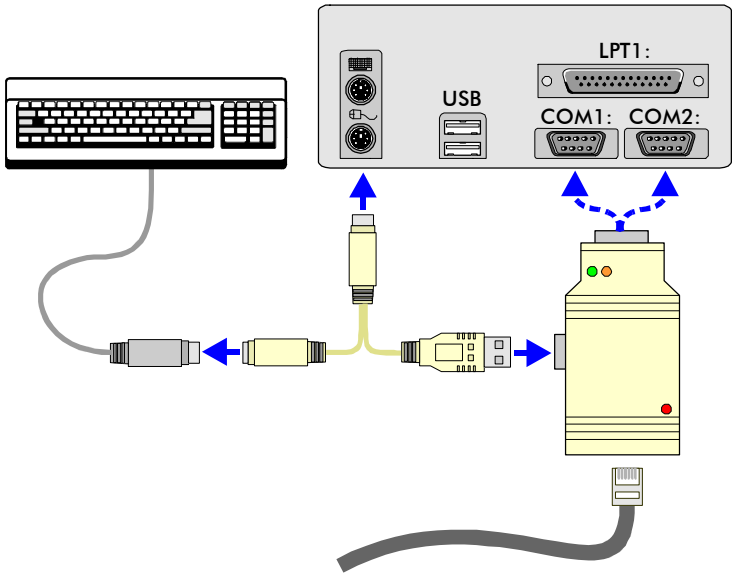


Fig. 6: CANKey connection via serial PC port

The connection of the adapter to the seriel port should be done in the following manner:

1. Shut down your computer and turn it off (mains switch)
2. Remove the keyboard plug*) from the PC and attach the power supply cable (which was delivered with the CANKey) instead of it to the keyboard connector (PS/2) of the PC
3. Connect the keyboard*) to the power supply cable
4. Attach the power supply cable to the USB connector on the sidepiece of the CANKey (this only provides the power supply to the adapter)
5. Plug the CANKey with its RS-232 socket to an available serial port of the PC (COM1:, COM2:, COM3: or COM4:)
6. Turn on the PC; the red status LED on the CANKey should start flickering (if not, turn off the PC immediately and check the connection cables)
7. Now the Zimo CAN bus can be attached by inserting the Western plug of the CAN bus cable into the proper socket of the adapter
8. You can leave the adapter permanently connected to the computer.

*) Alternatively instead of the keyboard also the mouse can be connected via the power supply cable if it also uses a PS/2 plug for the connection to the PC.

For all connecting and disconnecting operations of the CANKey the computer should be shut down and turned off before.

2.4. First-time operation, test using CANfigurator

If the CANKey is to be used with another software product than STP the following steps may be different.

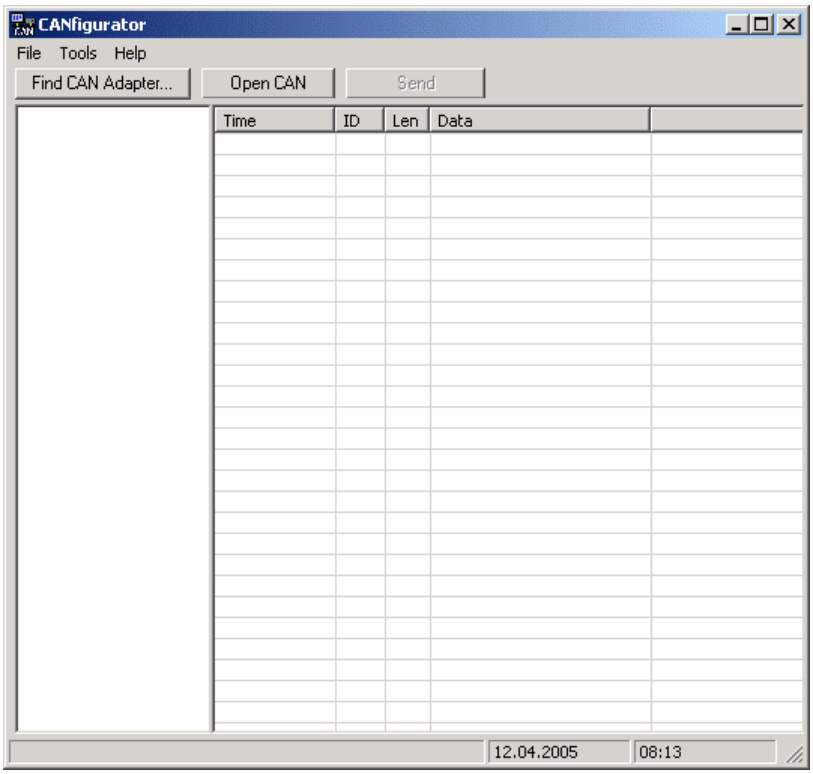
If you should have ordered the CANKey together with STP or as supplement to an already existing STP version, a STP setup CD is included with the CANKey.

After successful connection of the CANKey to a serial or a USB port you should check if the adapter works as intended. For this purpose the **CANfigurator** software has been installed together with your model railroad control software.

If you should not have STP already installed on your computer or the version you are using is earlier than STP V5.06, please now insert the STP setup CD into the optical drive of your PC and install the software. Instructions for the installation will be shown on-screen or can be found in the STP manual.

Important note: Because two programs are not allowed to access the CANKey simultaneously, the model railroad control software and the CANfigurator software cannot be active at the same time.

If you then start the CANfigurator program (when using STP this is: **Start** | **Programs** | **STP** | **CANfigurator**) the following window will be shown:



Detection of the CAN adapter

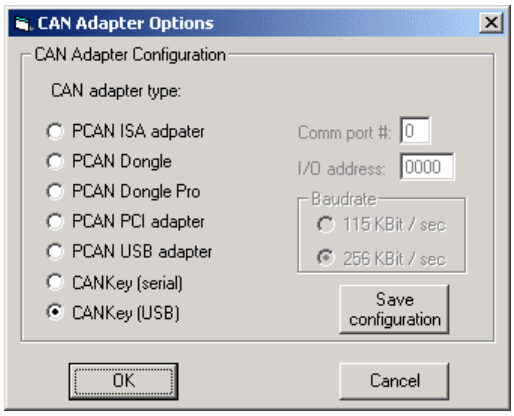
First you should allow the program to detect any attached CAN adapter automatically. Click at the button **Find CAN Adapter...** and wait until the adapter is detected. This auto-detection functionality also works for CAN adapters from Peak System (except for the Peak ISA card). You may interrupt the detection process anytime by clicking at the **Close** button.

After successful detection, the adapter type along with version information of the firmware as well as the driver will be shown.

Click at **OK** to close this window. If the adapter was not recognized automatically, the configuration can also be done manually as described in the next step.

Saving of the configuration for usage with STP

Now open the **Options** dialog window by selecting **Tools | Options...** from the menu. In the **Options** window the detected adapter type will already be pre-selected.



The PCAN ISA adapter by Peak System has to be configured manually in any case because an auto-detection is not possible for this adapter type.

If the adapter has not been detected automatically in the previous step, you now can select the proper adapter type manually. Depending on this adapter type it may be necessary to enter additional information at the right side of the window (e.g. for the serially connected CANKey the number of the COM port has to be entered, i.e. 1 for COM1: etc.) – if the detection was done automatically, this information is already present.

To take over the settings shown here into the CAN adapter configuration of STP, click at the **Save configuration** button. When doing so, there is no need for the CAN adapter setup in STP (**Configuration | Global interface setup...**). The options shown here will then also be present again when the CANfigurator is started the next time.

Display of CAN bus data traffic

The CANfigurator also allows you to monitor the data traffic on the CAN bus. To do so, click (with properly configured adapter, see previous steps) at the **Open CAN** button.

Zeit	ID	Len	Daten
13:21:20.927	610	0	
13:21:23.060	137	1	40
13:21:23.090	618	0	
13:21:26.445	13F	5	00 00 3E 40 43
13:21:26.946	608	0	
13:21:27.216	610	0	
13:21:29.409	618	0	
13:21:29.840	13F	5	03 3D 00 00 00
13:21:33.215	137	1	40
13:21:33.235	608	0	
13:21:33.495	610	0	
13:21:35.738	618	0	
13:21:36.590	137	1	40

After that all CAN bus data telegrams which are sent on the bus will be shown in the right part of the program window (including their corres-

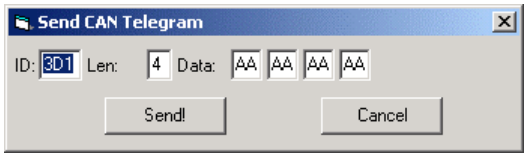
ponding time stamp). The list will store the last 100 data telegrams. Using the scrollbar at the right you can browse through the list.

By clicking on the **Close CAN** button, the protocol feature will be disabled - the recently received information will still remain visible- though. The list will be cleared when **Open CAN** is activated the next time.

Transmission of user-defined CAN data telegrams

Only use this function when you are familiar with the internas of the Zimo CAN bus or you have detailled instructions what to do (e.g. from the CSA-32 manual).

To send data telegrams of your own (e.g. for testing and parametrization of CSA-32 modules), the CAN adapter must be accessible (see previous step, **Open CAN**). Now click at the **Send** button to open the dialogue window shown below:



Enter the CAN telegram ID under **ID** and under **Len** the number of data bytes (0-8) to be transmitted. In the data entry fields after **Data** the values for each byte of the telegram have to be entered (all in hexadecimal notation). By clicking on **Send!**, a CAN telegram with the given information will be transmitted. Telegrams that have been sent will be shown in a blue font in the protocol list (see previous step). The protocol functions remain active also when the **Send CAN Telegram** window is present in the foreground.

If no further CAN telegram should be sent, close the transmission window by clicking on **Cancel**.

2.5. Integration with STP

STP can also be started with the previously supplied STP Program Key.

Because the STP CANKey is also used for license verification, it has to be installed and operational before STP can be started (see also under "First-time operation, test using CANfigurator" on page 13). STP checks during program start if the CANKey is present and will show an error message ("Program Key not detected") if this is not the case.

This step may be omitted if the setup of the CANKey has been done using the CANfigurator software and the result has been saved.

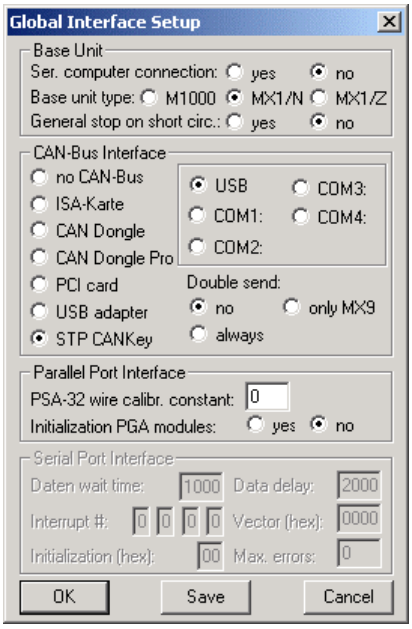
STP has to be configured properly to access the CANKey at all. If STP is installed from scratch and the CANKey is attached to the USB port, this is not a problem, because this matches with the defaults of STP after a fresh installation. If an update from a previous version has been made, STP should first be started with the "old" Program Key (as before). After proper setup (explained below) and saving of the configuration, the Program Key can be removed (the PC should be shut down before).

Important nore for a fresh installation of STP: When the CANKey is attached to a serial PC port (i.e. *not* using USB), you **must** set up the CANKey before using the CANfigurator software (see "Saving of the configuration" on page 14).

To configure an already existing / updated version of STP for usage of the CANKey, proceed as follows:

1. Install the CANKey in an availabe USB or serial port of your PC (see previous chapter) – the red LED on the CANKey should flicker rapidly

2. Install the new STP version delivered with the CANKey (if newer than your current version and if you have not done so yet) - the CANKey is supported from STP V5.06 upward.
3. Start the newly installed STP version (do not forget that the STP Program Key should also be left attached)
4. Open the **Global Interface Setup** dialog window (**Configuration | Global interface setup...**)



5. Under **CAN-Bus Interface** select the **STP CANKey** entry and on the right the port to which the adapter is connected (**USB**, **COM1:**, **COM2:**, **COM3:** or **COM4:**)
6. Click at **Save**.

If you previously have used the Program Key, you may remove it after the next shut down of the computer. Note that now the CANKey has to be attached to the PC before STP can be started.

To test if the adapter is working properly under STP, activate STP's online mode (**Control | Online**). The red LED on the adapter now should blink with a frequency of 3-4 times / sec (this is slower than when the adapter is just attached to the PC). When data from the CAN bus is received, the green LED should blink, when data from the PC is sent, the yellow LED should blink. When the online mode is deactivated, the red LED should blink with a very low frequency (1x / sec).

2.6. Problem survival guide

If the adapter does not work as expected, here some tips to make the location of troubles somewhat easier:

If the red LED does not light up (flash) when powering up the adapter, detach the adapter from the PC immediately, shut down the PC, turn it off and execute the following checks:

- Is the module correctly connected to the PC (see "PC connection via USB" on page 8 resp. "PC connection via RS-232" on page 12)?
- When connecting the adapter via USB it is possible that the CANKey does not always start up correctly (i.e. all LEDs remain dark, but an acoustical sign reports that an USB device

has been attached to the computer); in this case detach the adapter from the PC, wait 3 seconds and then re-attach it again (the computer does not have to be shut down in this case)

- Is the Zimo CAN bus disconnected from the adapter when doing a first-time installation?
- If connecting the adapter to an USB hub: Is the power supply of the hub turned on?
- Does the problem also occur, if the adapter is connected to a different port (i.e. COM1: instead of USB, COM2: instead of COM1: etc.)?

F.A.Q. (Frequently Asked Questions):

F: STP does not start and the message ""Program Key not detected" comes up.

A: Check if the CANKey adapter is connected and working properly. If yes, try to start STP with an "old" Program Key (if available) and follow the steps given in chapter "Integration with STP" on page 15. If you have connected the CANKey to a serial port using an extension cable, check if all 9 wires of the cable are connected 1:1.

F: After powering up the adapter for the first time, the LED does not flash, but is constantly on and /or the yellow or green LED is lit / blinks

A: Shut down the computer and disconnect the module. Check all connections and restart the computer. Remove (on a trial basis) the Zimo CAN bus cable. If the problem persists, contact the manufacturer with an exact explanation of the problem.

F: The adapter seems to work properly (according to the LED indicators), but no data is transmitted over the CAN bus.

A: Check if the CAN bus cable to the Zimo system is attached properly and that it shows no defects. Shut down the computer and the Zimo system and restart both (without attaching the CAN bus cable to the CANKey). Attach the CAN cable just before activating Online mode in STP. It could also be necessary to remove the "ground" connection within the the CAN cable to the adapter (see "Technical specifications" on page 19).

F: When starting STP I get an error message that the "Program Key" cannot be detected.

A: Start the CANfigurator program and set the options for the CANKey properly (or do an automatical adapter recognition). Then click at **Save configuration** in the **Tools** | **Options...** dialog window.

For persistent errors the following procedure is recommended:

- Switch off computer
- Switch off Zimo system
- Remove connection between CANKey and Zimo system (i.e. the CANKey remains connected to the PC via the USB or serial cable)
- Start PC
- The red LED should blink now in a quick sequence
- Attach CAN cable from the Zimo system
- The red LED should continue to blink quickly
- Start up STP
- The red LED should now blink in a slower manner
- STP has started

- Switch on the Zimo system
- The red LED should continue to blink in a slow manner
- Activate STP **Online** - mode

F: When my PC restarts from sleep mode, the CANKey does no longer operate properly / there are problems when putting the PC into sleep mode. What can I do?

A: Unfortunately some computer / operating system combinations have problems putting USB devices into sleep mode properly or restarting them after sleep mode. If this problem should appear on your system it normally is best to deactivate sleep mode completely in the Windows System Management (at least while using the PC for model railroad control). If the CANKey does not "awake" correctly after sleep mode, it should be sufficient to unplug the adapter for a short period and to re-connect it again. Please note that the CANKey will be uninitialized after sleep mode, so if Online mode was active before entering sleep mode, the Online mode has to be stopped and re-entered after awaking from sleep mode, because otherwise the CAN bus communication will not work properly. It is recommended not to put the PC in sleep mode while STP Online mode is active.

F: When attaching the Zimo CAN bus cable to the CANKey, the red status LED goes off and the CANKey cannot be accessed any more.

A: The CANKey is susceptible to static electricity, ground loops and voltage differences between PC and digital command system. Unplug the CANKey from the power supply in this case (remove the plug from the USB socket of the adapter and re-insert it again). The red LED should start flickering again (if not, repeat the process). If the problem should appear more frequently, it is recommended to start up the digital command system before turning on the PC and to establish the connection PC – CANKey and CANKey – Zimo CAN bus before switching on these systems.

3. Addendum

3.1. Technical specifications

Adapter dimensions:	approx. 80 x 42 x 20 mm (1/4" x 1/8" x 13/16") (without socket extensions, else 85 x 50 mm)
Supply voltage:	5V DC (via USB or PC keyboard connector)
Power consumption:	90mA, 400uA in sleep mode
Ambient temperature:	0 – 60 °C (32 °F –140 °F)
Max. rel. humidity:	85 %
PIC controller:	Microchip PIC18F248
CAN line driver:	PCA82C250 (or 82C251)
Serial line driver:	ICL3222
Clock frequency controller:	32 MHz (8 Mhz Quartz x 4, PLL HS4)
USB interface chip:	FTDI FT232BM

Pin layout for Zimo CAN bus plug:

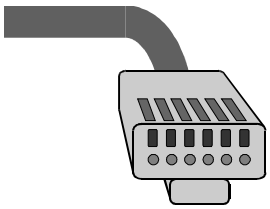


Fig. 7: Pin layout for Western plug (Zimo CAN bus)

Pin	Assignment
1	Power supply from base unit (approx. 40V) *)
2	Ground shield *)
3	CAN_L
4	CAN_H
5	Ground
6	SS signal (for old Zimo data format) *)

*) Pin not connected inside of CANKey adapter

Pin assignment of serial CANKey connector:

Pin	CANKey assignment
2	RxD, serial data reception
3	TxD, serial data transmission
4	DTR, Data Terminal Ready, PC notifies CANKey to use the

	serial interface (and not USB)
5	GND, ground
7	RTS, Request To Send, data synchronisation line
8	CTS, Clear To Send, data synchronisation line

Important: To indicate the CANKey whether to use the USB or the serial interface, the PC has to set the DTR line (pin 4) to logical "1" if the data transmission should be done using the serial connection (RS-232).

Pin layout for CANKey USB connector

Pin	Assignment
1 (left, i.e. facing toward the RS-232 conn.)	+5V supply
2	Data -
3	Data +
4	Ground

The power supply cable, which is used when connecting the CANKey to the serial port (RS-232) of the PC, gets the +5V supply and ground from the keyboard feed and connects it to pin 1 and 4 of the USB connector (see also "PC connection via RS-232" on page 12).

3.2. Data transmission protocol

All data telegrams (with the exception of the initialization telgram) have the structure

```
<command byte> [<data byte>...]
```

where the command byte can be recognized by a hexadecimal "2" in the upper half byte. Data bytes must not contain command bytes, so all data bytes in the range 0x20 ... 0x2F are prefixed by an 0x2E byte ("escape") and the 5th bit of the data byte will be set to 0. After reception the 0x2E byte is removed and the 5th bit will be set again. The 0x2E byte is not considered for all length calculations. Note: For data sent from the CAN-Key to the PC this is only true for CAN data telegrams, not for other answers to the PC.

The data communication is initiated from the PC (i.e. the PC sends, the CANKey answers), except for received CAN telegrams in Online mode, (in this mode the CANKey sends every received telegram to the PC immediately) and after a reset of the CANKey (the adapter then sends an INIT request to the PC).

Online mode (CAN active)

PC sends:

**2E 2E 2E 2E 2A
** Initialization, BR = divisor for CAN baud rate (0x10 = 125 kBit/sec, 0x08 = 250 kBit/sec, ... 0x00 and 0xFF are not allowed)

CANKey answers:

2A Online mode (CAN communication is active); this message will also be sent if the adapter has been in Online mode before

2F Unrecognized command, protocol error

Offline mode (CAN inactive)

PC sends:

2A 00

CANKey answers:

29 CANKey is now in Offline mode, i.e. no more data is send to the PC spontaneously

2F Unrecognized command, protocol error

Status request

PC sends:

2A FF

CANKey answers:

2A Online mode (CAN communication active)

29 Offline mode (CAN communication inactive)

2F Unrecognized command, protocol error

Send CAN telegram (only in Online mode)

PC sends:

2<x> <IDH> <IDL> [<D0>...] **<x>:** Length of the remaining bytes (0 - 8) without ID.

<IDH>, <IDL>: High byte (bit 11.. 8) and low Byte (bit 7..0) of the CAN Id.
<D0>: data byte 0, <D1..7>: data byte 1 .. 7
Ex.: CAN telegram ID=78, D0=12, D2=34
PC command: 24 00 78 12 34

CANKey answers:

2F Command not recognized (serial overflow), or unable to send CAN command even after retry (8x)

29 CAN command has been sent

CAN telegram received (only in Online mode, spontaneous)

CANKey sends:

2<x> <IDH> <IDL> [<D0>...] **<x>:** Length of the remaining bytes (0 - 8) without ID.

<IDH>, <IDL>: High byte (bit 11.. 8) and low Byte (bit 7..0) of the CAN Id.
<D0>: data byte 0, <D1..7>: data byte 1 .. 7
Ex.: CAN telegram ID=123, D0=00
PC command: 23 01 23 00

2C CAN overflow, telegrams have been lost

Init-request from CANKey (only in Online mode, spontan.)

CANKey sends:

2E 2E 2E 2E Initialization request

PC answers:

**2A
** Initialization, BR = divisor for CAN baudrate (0x10 = 125 kBit / sec, 0x08 = 250 kBit / sec, ... 0x00 und 0xFF are not allowed)

CANKey answers:

2A Online mode (CAN communication active); this message will also be sent if the adapter has been in online-Mode before

2F Unrecognized command, protocol error

3.3. Operating environment

When operating the CANKey the following conditions and prerequisites should be observed:

- An outdoor operation or operation in humid environment is not allowed.
- Contact with splashing water or other liquids has to be avoided.
- The adaptor should not be used in an environment containing combustible gases or fumes.
- If the adapter has been in contact with moisture (i.e. condensed water), after drying it has to be checked by a qualified technician before it can be operated again.
- When operating the adapter, the nominal voltage ranges for the power supply as well as for input and output signal levels have to be adhered to.
- The ambient temperature must be in the range of 0° to 40° C (32 °F –100 °F)
- Operation of the adapter by a minor has to be supervised by an knowledged adult or a technician.

Please note that by not obeying these notes the implied limited warranty for the product will be void.

3.4. Limited warranty conditions

We provide a limited warranty for this product for two years. The warranty includes remedying of faults which can be unambiguously attributed to faulty material or production faults.We guarantee an operation of the adapter according to its characteristic quantities when installation as well as operation of the adapter is done according to the rules given in this instruction booklet.

Additional claims are excluded. We do not assume any liability in excess to legal rules given by the national legislation. We reserve to do a repair, improvement, substitute delivery or refund of the payment.

The right to claim under guarantee is void under the following conditions:

- for damages caused by non-obeying the instructions or the connection plan,
- when modifying or attempting to repair the adapter,
- when unauthorizedly changing the circuitry,
- for damages caused by overload of the adapter,
- when connecting the adapter to invalid voltage levels or current types or to unintendted interface ports (even if they allow a mechanical and electrical connection with the adapter),
- for damages caused by manipulation from third parties,
- for invalid operation or damages caused by negligence or misuse,
- for damages caused by electrostatic discharge when touching parts of the adapter.

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